



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,775	09/24/2003	Darren Mennie	M03B179	4354

7590

06/22/2005

Ira Lee Zebrak
The BOC Group, Inc.
Legal Services - Intellectual Property
100 Mountain Ave.
Murray Hill, NJ 07974

EXAMINER

ORDERS, CHRISTOPHER H

ART UNIT	PAPER NUMBER
----------	--------------

3746

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/669,775

Applicant(s)

MENNIE, DARREN ET AL.

Examiner

Christopher H. Orders

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 3,5,6,20,23 and 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,7-19,21,22 and 25-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date September 16, 2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claim 20 is treated as withdrawn as indicated on pg. 6 of the applicant's reply on June 9, 2005, and it is noted that applicant's listing of claims improperly lists this claim as original (pg. 4) when it should appear as withdrawn.
2. Applicant's election with traverse of Species A and then Species C in the reply filed on June 9, 2005 is acknowledged. The traversal is on the ground(s) that the restriction is improper (pg. 6-7). This is not found persuasive because examiner maintains that the restriction requirement was indeed proper to thoroughly examine the patently distinct inventions claimed in the application. The alternate embodiments presented differ enough to require significantly more extensive search, as alternate embodiments for accomplishing the same end result in this field of endeavor are not typically disclosed within single applications, making each embodiment effectively a brand new search. It is additionally pointed out that the examination burden is not limited exclusively to a prior art search but also includes the effort required to apply the art by making and discussing all appropriated grounds of rejection. Examiner does however agree with applicant that claim 7 is generic, and therefore is examined on the merits.

The requirement is still deemed proper and is therefore made FINAL.

Specification

3. The disclosure is objected to because of the following informalities: "chamber 100" (pg. 12, ln. 13) is presumed to be --chamber 102-- to properly reference the drawings.

Appropriate correction is required.

Claim Objections

4. Claim 7 is objected to because of the following informalities: The recitation of "recirculating first gas" (ln. 2) is presumed to be --recirculating the first gas-- for proper antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 7, 8, 12-19, 22, 25-27, and 30-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Melnychuk et al (6,815,752).

Melnychuk et al. teach a vacuum pumping system comprising a pump (12) having an inlet for receiving from a vacuum chamber (labeled "vacuum chamber" in Fig. 1) at least a first gas (xenon, col. 6, ln. 51-53) to be pumped (Col. 5, ln. 44-46); means for supplying a second, purge gas (helium, col. 6, ln. 39-40) to be pumped with the first gas (xenon); the pump (12) having an outlet for exhausting a gas stream comprising the first gas (xenon) and the purge gas (helium); and gas separating means (14) for receiving the gas stream and recovering the purge gas (helium) from the stream, the supply means being arranged to receive from the gas separating means (14) the recovered purge gas (helium) (col. 9, ln. 43-48); first gas (xenon) recirculating means (through heat exchanger 20, then back to the tank then vacuum chamber) for recirculating first gas (xenon) from the separating means (14) to the vacuum chamber (Fig. 1 "vacuum chamber"); the recirculating means comprises means for purifying the received first gas (22); the first pump (12) comprises a turbo-molecular pump (Col. 6, ln. 38-40); the first gas (xenon) comprises a low thermal conductivity gas (xenon, as seen in Fig. 18c entering through 4); the purge gas (helium, as seen in Fig. 18c entering through 12) is lighter than the first gas (xenon).

Melnychuk et al. further teach a vacuum pumping system, comprising first gas supply means (4 in Fig. 18c) for supplying a first gas (xenon) to a vacuum chamber (10 in Fig. 18c); a pump (14 in Fig. 18c) arranged to receive at least the first gas (xenon) from the chamber (10 in Fig. 18c); second gas supply means (12 in Fig. 18c) for supplying a second gas (helium) for pumping with the first gas (xenon); and gas separating means (14 in Fig. 1) for receiving a gas stream output from the pump (12 in

Fig. 1), recovering the first (xenon) and second (helium) gases from the gas stream, outputting the recovered first gas (xenon) to the first gas supply means (4 in Fig. 18c) for recirculation through at least the chamber (10 in Fig. 18c) and outputting the recovered second gas (helium) to the second gas supply means (12 in Fig. 18c) for recirculation through at least the pump (12 in Fig. 1) (col. 9, ln. 47-48).

Melnychuk et al. additionally teach an extreme ultra violet lithography apparatus (fig. 1) comprising a vacuum pumping system (fig. 1) (Col. 4, ln. 19-22).

Melnychuk et al. additionally further teach a method of vacuum pumping, comprising receiving at a pump (12 in Fig. 1) at least a first gas (xenon) from a vacuum chamber ("vacuum chamber" in Fig. 1), and a second, purge gas (helium) for pumping with the first gas (xenon); exhausting from the pump (12 in Fig. 1) a gas stream comprising the first (xenon) and second (helium) gases; recovering the second gas (helium) from the stream and recirculating the second gas (helium) through at least the pump (12 in Fig. 1) (Col. 9, ln. 47-48); the pressurized gas stream is purified (by filter 22) prior to the recovery of the second gas stream therefrom; the first gas (xenon) is recovered from gas stream and recirculated to the vacuum chamber ("vacuum chamber" in Fig. 1) (col. 9, ln. 47-48); the recovered first gas is purified (by filter 22) prior to its return to the vacuum chamber ("vacuum chamber" in fig. 1); the recovered first gas is pressurized prior to its return to the vacuum chamber ("vacuum chamber" in fig. 1) (by circulating through pump 12). Note that the unique configuration of the pump creates flow that brings some flow through the pump before separation, and some flow

through the pump after separation, meeting the limitations of seemingly different limitations.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of Wycliffe (4,995,794).

Melnichuk et al. teach many of the claim limitations, including that the first gas is pressurized (by pump 12) prior to its return to the vacuum chamber, but do not expressly teach that the supply means is arranged to supply the purge gas directly to the pump. However, Wycliffe teaches a vacuum pumping system wherein the supply means (15) is arranged to supply the purge gas directly to the pump (1) pumping chamber (5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the direct injection of purge gas into the pump for the benefit of creating a high enough velocity and throughput of the purge gas to effectively remove the contaminants (Wycliffe col. 3, ln. 5-16).

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of Okumura et al. (5,236,562) and Maruyama et al. (5,836,746).

Melnychuk et al. teach many of the claim limitations including an outlet (through filter 22) for exhausting the gas stream to the gas separating means (14), but do not expressly teach a second pump having an inlet for receiving the gas stream from the first-mentioned pump. However, Okumura et al. teach a vacuum pumping assembly (Fig. 1) with a roughing pump (C) in series after a turbo-molecular pump (B). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the roughing pump of Okumura et al. with the vacuum pumping apparatus of Melnychuk et al. for the benefit of creating a pressure that helps the turbo-molecular pump to operate (Maruyama et al. col. 2, ln. 24-36).

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of Basting et al. (5,430,752).

Melnychuk et al. teach many of the claim limitations, but do not expressly teach that the pressure of the gas stream exhausted from the pump is increased prior to the recovery of the second gas therefrom. However, Basting et al. teach using an additional pump (72) to increase the pressure of a gas stream prior to cryogenic separation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the pump of Basting et al. with the vacuum apparatus of Melnychuk et al. for the benefit of motivating the fluid through the separation means.

11. Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of MacLean et al.

Melnychuk et al. teach many of the claim limitations including separating the working and buffer gases by cooling (col. 6, ln. 40-42) to recover the gases (col. 9, ln.

Art Unit: 3746

47-48). Melnychuk et al. do not however expressly teach that the separating means comprises cryogenic separating means for separating cryogenically the first gas from the gas stream nor the method of doing so. However, MacLean et al. teach a separating means (fig. 6, "cryogenic distillation unit") that separates a first gas (argon) and a second gas (nitrogen) cryogenically, and does so by condensing the first gas ("liquid argon") without condensing the second gas (nitrogen) as inherently occurs when relying on the different condensation points of the two gases during cryogenic separation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the cryogenic separating means of MacLean et al. with the vacuum pump apparatus of Melnychuk et al. to separate a working gas and a buffer gas using cooling as suggested by Melnychuk et al. (col. 6, ln. 40-42).

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of Puech (6,644,931).

Melnychuk et al. teach many of the claim limitations, but do not expressly teach that the recirculating means comprises means for pressurizing the received first gas. However, Puech teaches recirculating means (6, 10, 110) for purifying (10), pressurizing (6), and recycling (110) a working gas. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the pressurizing means of Puech with the vacuum pumping apparatus of Melnychuk et al. to reduce the heating of the pumped fluid through the main pump (col. 4, ln. 48-65).

13. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melnychuk et al. (6,815,700) in view of Puech (6,644,931) as applied to claim 9 above, and further in view of MacLean et al. (4,750,925).

Melnychuk et al. in view of Puech teach many of the claim limitations, but do not expressly teach that the separating means comprises cryogenic separating means for separating cryogenically the first gas from the gas stream to recover both the first and second gases. However, MacLean et al. teach a separating means (fig. 6, "cryogenic distillation unit") that separates a first gas (argon) and a second gas (nitrogen) cryogenically, and does so by condensing the first gas ("liquid argon") without condensing the second gas (nitrogen) as inherently occurs when relying on the different condensation points of the two gases during cryogenic separation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the cryogenic separating means of MacLean et al. with the vacuum pump apparatus of Melnychuk et al. in view of Puech to separate a working gas and a buffer gas using cooling as suggested by Melnychuk et al. (col. 6, ln. 40-42).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher H. Orders whose telephone number is (571) 272-7163. The examiner can normally be reached on Monday-Friday, 7:30am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on (571) 272-4444. The fax phone

Art Unit: 3746

number for the organization where this application or proceeding is assigned is 703-872-9306.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CHO
6/14/2005

CHO



Timothy S. Thorpe
Supervisory Patent Examiner
Group 3700